Introduction

Zilog's ZMOTION Development Kit provides a general-purpose platform for evaluating the capabilities and operation of the ZMOTION Detection and Control Family of microcontrollers featuring Zilog's passive infrared (PIR) technology. The family includes a series of high-performance microcontrollers with integrated motion detection algorithms. A variety of included lenses and pyroelectric sensors demonstrate the flexibility of the integrated motion detection algorithms to provide the best possible performance for a range of lighting, detection and control applications.

The Z8FS040 MCU, a prominent member of the ZMOTION Detection and Control Family, combines the programmability and rich peripheral set of Zilog's Flash Z8 Encore! XP® Family of MCUs with built-in motion detection software algorithms to provide the functions necessary for PIR motion detection applications. These motion detection algorithms comprise Zilog's PIR technology and run in the background while control and status of the motion detection engine is accessed through a software Application Programmer Interface (API). As a result, the designer can create his or her own application-specific software while taking advantage of Zilog's ZMOTION Motion Detection Technology.

Within this kit, API settings are provided to match the Engine operation to each of the lens and pyroelectric sensor combinations provided.

For more details about the ZMOTION MCU, refer to the ZMOTION Product Specification (PS0284), available for download at www.zilog.com.

Kit Contents

The ZMOTION Detection and Control development kit contains the following hardware, software and documentation:

Hardware

- ZMOTION Development Board
- USB Smart Cable Debugger
- 0.9" Focal Flat Lens Holder
- 0.77" Focal Circular Lens Holder
- Selection of lenses
- Selection of pyroelectric sensors
- Mica insulating washers
- DB9–DB9 serial cable
- Wall mount 5 V DC power supply
- An assortment of mounting hardware

The contents of the kit are shown in Figure 1.

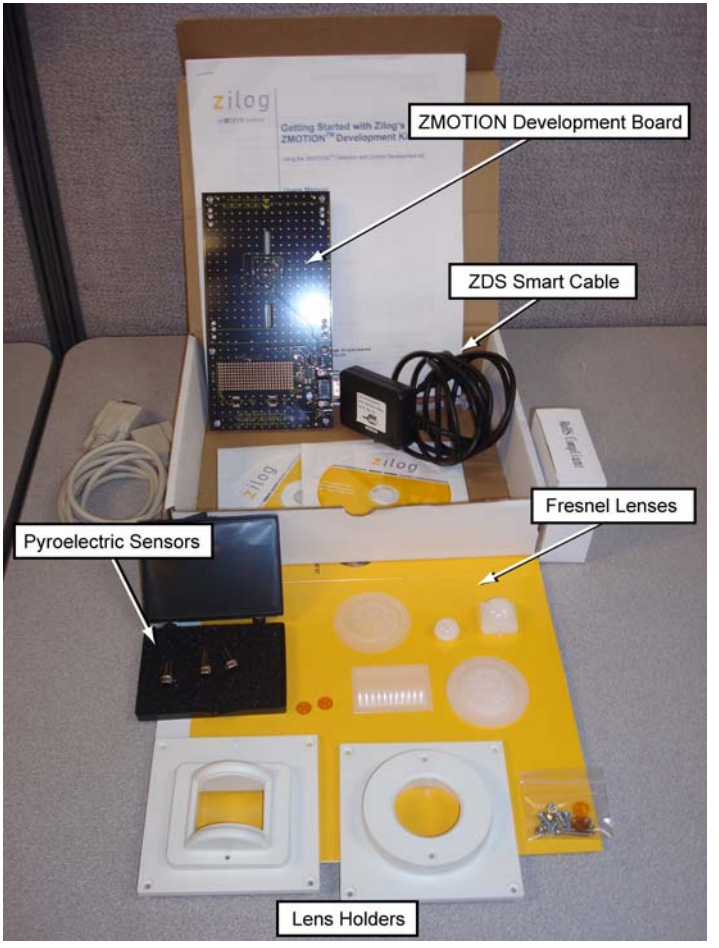


Figure 1. ZMOTION Detection and Control Development Kit Contents

Software (on CD-ROM)

- ZDSII – Z8 Encore! IDE with ANSI C-Compiler
- Sample Code:
  - ZMOTION Basic
  - ZMOTION Serial

Documentation

- ZMOTION Detection and Control Development Kit Quick Start Guide (QS0076)
- ZMOTION Family Technical Documentation (on CD-ROM)
  - ZMOTION Detection Module Product Brief (PB0223)
  - Zilog's ZMOTION Detection and Control Family Featuring PIR Technology Product Brief (PB0225)
  - ZMOTION Detection and Control Family Featuring PIR Technology Product Specification (PS0285)
  - ZMOTION Lens and Pyroelectric Sensor Product Specification (PS0286)
  - ZMOTION Detection and Control Development Kit User Manual (UM0230)
  - ZMOTION – A New PIR Motion Detection Architecture White Paper (WP0017)
  - ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018)
  - Board Schematic, assembly drawing and artwork

Sample code files are included on the ZMOTION Sample Apps CD, and are located in the `ZMOTION_Basic` and `ZMOTION_Serial` folders.

System Requirements

An IBM PC (or compatible computer) with the following minimum configurations is required:

- Microsoft Windows XP Professional SP1/Windows 2000 SP3/Windows NT 4.0 SP6/Windows 98 SE
- Pentium II/233 MHz processor or higher up to Pentium IV, 2.8 GHz
- 96 MB RAM or more
- 25 MB hard disk space or more
- Super VGA video adapter
- CD-ROM drive
- One or more RS-232 communication ports
- USB 2.0 interface port

Installation

For details about installation and setup, refer to the Using the ZMOTION Detection and Control Development Kit Quick Start Guide (QS0076).

Safeguards

The following precaution must be observed when working with the devices described in this document.

Caution: Always use a grounding strap to prevent damage resulting from electrostatic discharge (ESD).

ZMOTION™ Detection and Control Development Board

Zilog's ZMOTION development board is a development and prototyping platform for the ZMOTION Detection and Control silicon and software as well as for lens/pyroelectric sensor/silicon and software bundled solutions. The board provides the user with a tool to evaluate the many features of ZMOTION PIR technology as well as the actual performance of each lens and pyro combination.

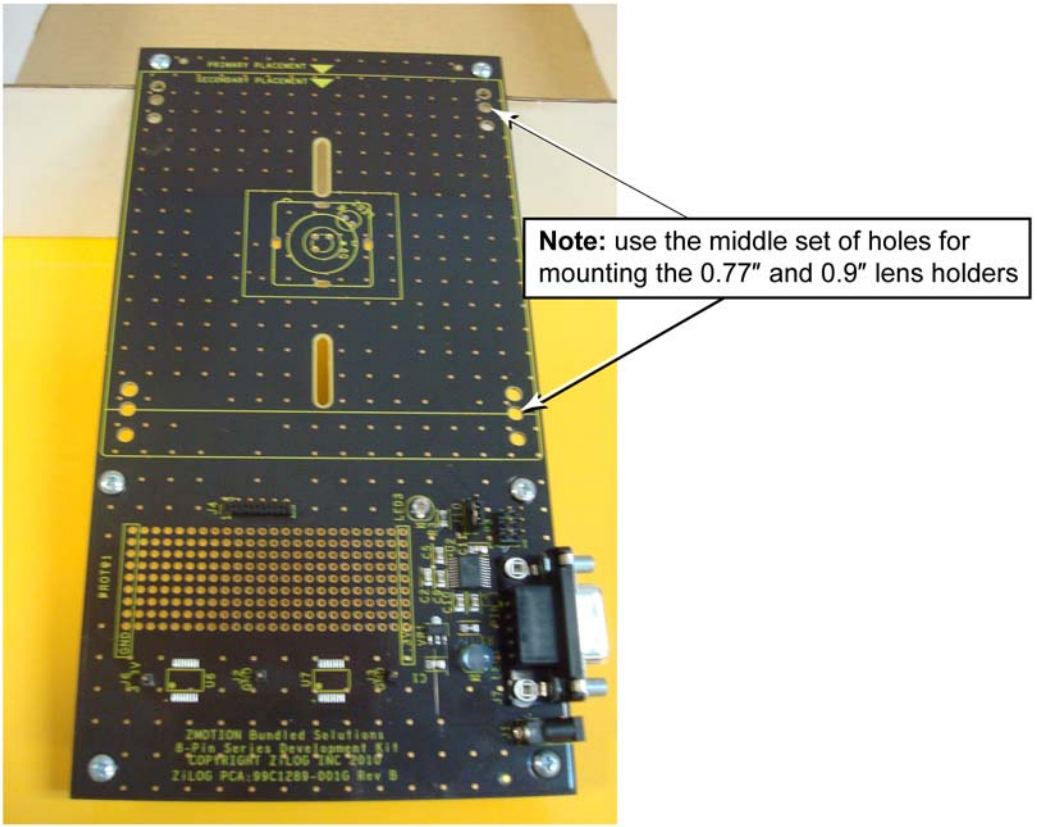


Figure 2. ZMOTION Detection and Control Development Board

Features

The ZMOTION Detection and Control development board features the following elements:

- Z8FS040 ZMOTION Detection MCU (8-pin SOIC)
- RS-232 serial interface

- 5 V DC power connector
- Power-On and Detection LED
- On-chip debugger interface
- Board openings for an assortment of lens holders and clip-on lens attachments

Note: The middle set of holes on the board is used to attach the 0.9″ and .77″ lens holders (see Figure 2).

- Prototyping area
- 2.7 V–3.6 V operating voltage with 5 V tolerant inputs

MCU Features

The Z8FS040 ZMOTION Detection MCU combines the programmability and rich peripheral set of Zilog's Flash Z8 Encore! XP Family of MCUs with built-in motion detection software algorithms to provide the functions necessary for PIR motion detection applications.

The Z8FS040 MCU includes the following features:

- High performance eZ8® MCU core
- 4 KB in-circuit programmable Flash memory available for application code
- Single-pin debug with unlimited breakpoints
- Flexible clocking scheme
- Internal precision oscillator running at 5.53 MHz
- External oscillator operating up to 20 MHz
- Sigma Delta ADC
- Up to 6 single-ended channels or 3 differential channels available

- On-chip analog comparator with independent programmable reference voltage
- Full-duplex UART with dedicated BRG
- Two 16-bit timers with input capture, output compare and PWM capability (11 modes total)
- Watchdog timer (WDT) with dedicated internal oscillator
- Up to 20 vectored interrupts
- 6 to 25 I/O pins depending upon package
- 2.7V to 3.6V operating voltage with extended operating temperature range –40°C to +105°C
- Zilog PIR technology controlled and monitored via software API registers
- Selection capability from an assortment of lenses and pyroelectric sensors to best fit your application
- API settings provided for each lens and pyroelectric sensor combination
- Directly supports 1 or 2 pyroelectric sensors
- Sensitivity control, range control and directionality detection
- Extended detection modes for occupancy sensing
- Low power modes

ZMOTION Detection and Control Development Kit Lens and Pyroelectric Sensors

The ZMOTION Detection and Control Development Kit includes five different types of lenses and three different types of pyroelectric sensors to fill a wide variety of lighting control, occupancy sensing, HVAC, display, proximity and power management applications. These applications

also demonstrate the flexibility, and superior performance of Zilog's PIR motion detection technology.

Please refer to the ZMOTION Lens and Pyroelectric Sensor Product Specification (PS0286) for part-specific details about the individual lenses and pyroelectric sensors. Refer to the ZMOTION™ Detection and Control Development Kit Quick Start Guide (QS0076) for specific installation instructions for the lenses and pyroelectric sensors.

Lens Mounting Options

The ZMOTION Development Board supports four lens-mounting options, as indicated in Table 1.

Table 1. Four Supported Lens-Mounting Options

Lens Mounting	Lens Supported
PIR Sensor Clip-On	NCL-9(26)
Circuit Board Clip-In	CWM 0.5 GI V1
Circular Lens Holder 0.77 Focal	CM 0.77 GI V3
	CM 0.77 GI V5
Flat Lens Holder 0.9 Focal	AA 0.9 GI T1

Pyroelectric Sensor Options

Table 2 lists three types of pyroelectric sensors offered in the ZMOTION Detection and Control Development Kit.

Table 2. Three Supported Pyroelectric Sensor Options

Pyro Sensor Description	Part Number
Basic Dual Element	RE200B-P
Premium Dual Element	SDA02-54-P
Quad Element	SBDI46-504AA

ZMOTION Development Kit Application Software

Included in the ZMOTION Application Software are two motion detection software projects: `ZMOTION_Basic` and `ZMOTION_Serial`. Each is decribed in this section.

ZMOTION_Basic

`ZMOTION_Basic` is an application program that demonstrates the basic functionality of motion detection for the board. It enables the user to select between lenses in the `main.h` file as well as make changes to the individual API lens configuration settings. Other changeable options in `main.h` are the LED duration time (0 sec to 30 minutes), hypersense on/off and duration time. Detected movement is indicated via LED3.

ZMOTION_Serial

The `ZMOTION_Serial` project allows all the same options for making changes to key parameters within the application project. Detected movement is indicated via the following Hyperterminal menu options (see Figure 3).

Menu. Select at any time to return to the main menu.

Read RAM. Allows any 3-digit hexadecimal register address location in RAM to be read and displayed.

Write RAM. Allows any 3-digit hexadecimal register address location in RAM to be written to.

Real Time Log & Display. Selecting a **1** will turn on the motion detection log. The display is formatted by an **M** or **E** to indicate basic motion detection or extended detection, followed by the detection count and a relative time stamp. Selecting a **0** turns off the detection log.

Reset Log/Display Counts. Clears out the display log and resets the count.

Display Log. Displays the relative time stamp of each motion event, starting with the most recent event (highest time stamp).

Prime. Selecting **Prime** will causes the Z8FS040 MCU to calculate and display sequential prime numbers. Motion detection continues to operate.

Display API Registers. Displays the current values in each API register.

For further information about API register settings, please refer to the *ZMOTION Detection and Control Family Featuring Zilog's PIR Technology Product Specification (PS0285)*.

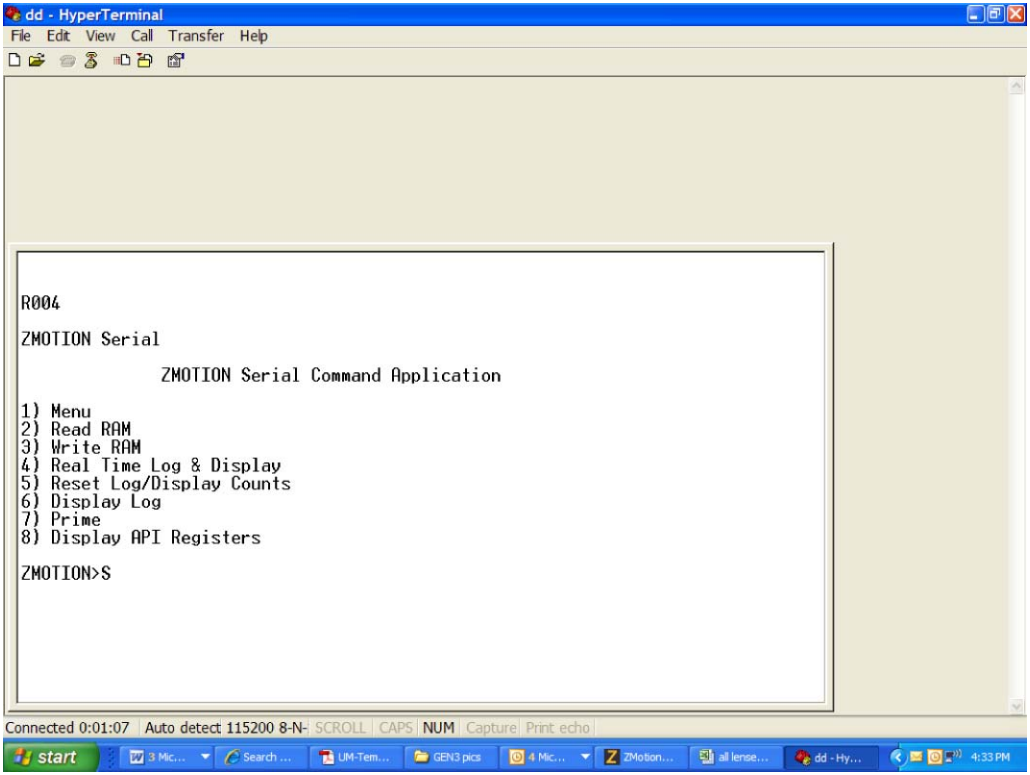


Figure 3. The ZMOTION_Serial project running in Hyperterminal

Board Design Information

Figure 4 displays the schematics for the ZMOTION Development Board.

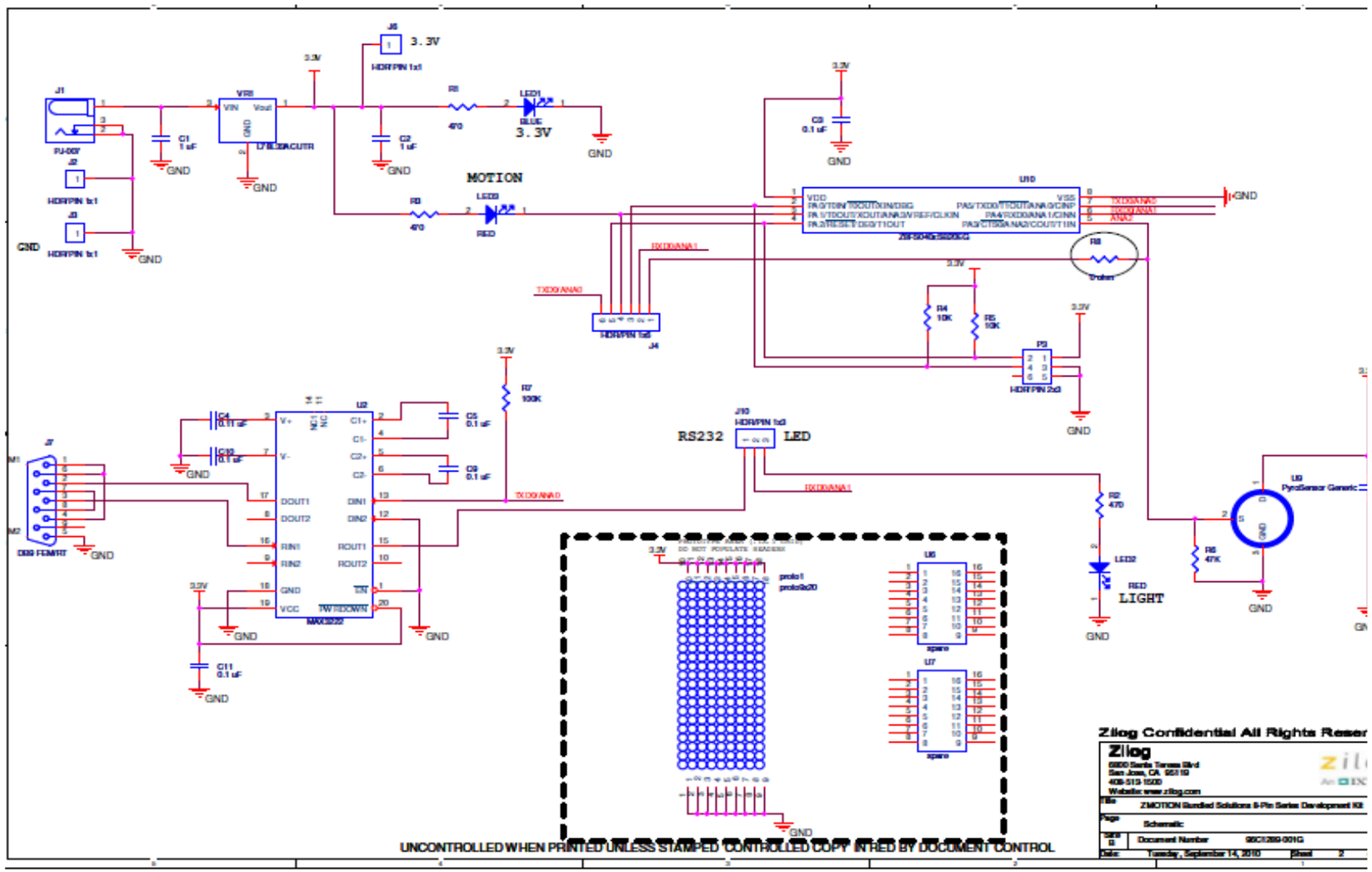


Figure 4. ZMOTION Development Board Schematic Diagram

Figure 5 displays a mechanical drawing of the ZMOTION Development Board.

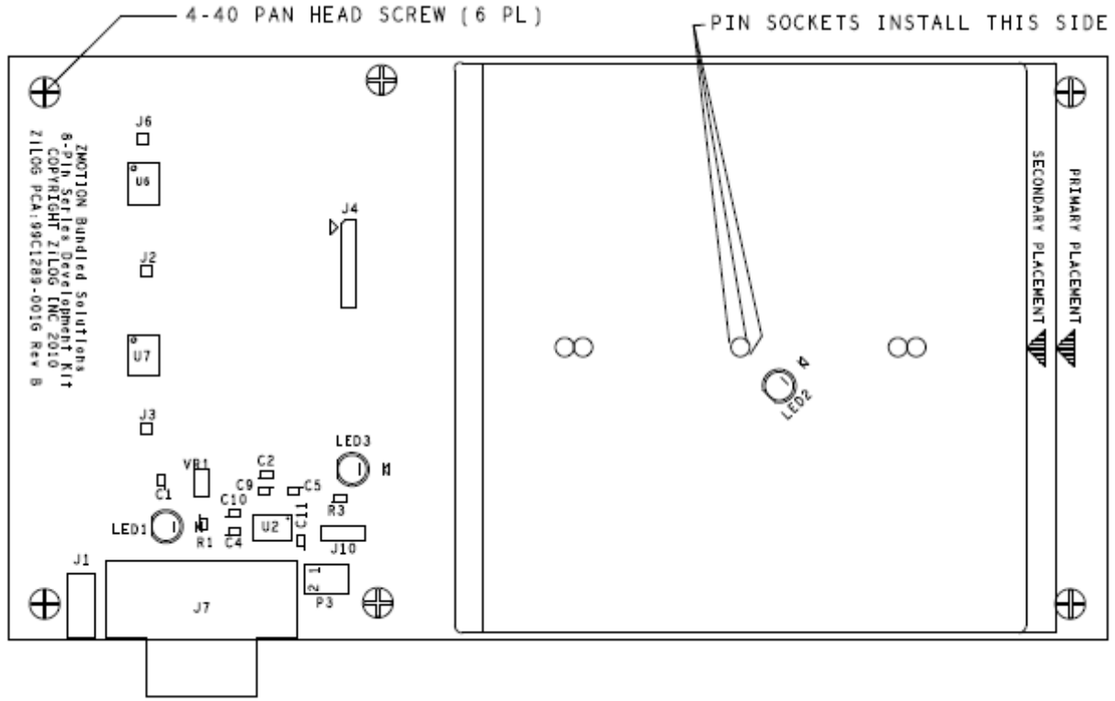


Figure 5. ZMOTION Development Board Mechanical Diagram

Introduction

Zilog's ZMOTION Intrusion Detection Development Kit provides a general-purpose platform for evaluating the capabilities and operation of the ZMOTION Intrusion Detection MCU, which features Zilog's passive infrared (PIR) technology. The ZMOTION Family of Motion Detection products includes a series of high-performance microcontrollers with integrated motion detection algorithms. A variety of included lenses and pyroelectric sensors demonstrate the flexibility of the integrated motion detection algorithms to provide the best possible performance for a range of lighting, intrusion detection and security-related control applications.

The Z8FS021 MCU, a prominent member of the ZMOTION Family, combines the programmability and rich peripheral set of Zilog's Flash Z8 Encore! XP® Family of MCUs with built-in motion detection software algorithms to provide the functions necessary for PIR motion detection applications. These motion detection algorithms comprise Zilog's PIR technology and run in the background while control and status of the motion detection engine is accessed through a software Application Programmer Interface (API). As a result, the designer can create his or her own application-specific software while taking advantage of Zilog's ZMOTION Motion Detection Technology.

Within this kit, API settings are provided to match the Engine operation to each of the lens and pyroelectric sensor combinations provided.

For more details about the ZMOTION MCU, refer to the ZMOTION Detection Module Product Specification (PS0284), available for download at www.zilog.com.

Kit Contents

The ZMOTION Intrusion Detection Development Kit contains the following hardware, software and documentation:

Hardware

- ZMOTION Development Board
- USB Smart Cable Debugger
- 1.2" Focal Flat Lens Holder
- Selection of lenses
- RE200B Pyroelectric Sensor mounted on the Development Board
- Mini-USB serial cable
- Wall mount mini-USB 5V DC power supply[1]
- An assortment of mounting hardware

Software (on CD-ROM)

- ZDSII – Z8 Encore! IDE with ANSI C-Compiler
- Sample Code: ZMOTION_Intrusion_Demo

Documentation

- ZMOTION Intrusion Detection Development Kit Quick Start Guide (QS0078)
- ZMOTION Family Technical Documentation (on CD-ROM)
  - ZMOTION Intrusion Detection Product Specification (PS0288)
  - ZMOTION Intrusion Detection Product Brief (PB0230)

1. Zilog recommends using only the power supply provided in the ZMOTION Intrusion Detection Development Kit.

- ZMOTION Detection and Control Product Specification (PS0285)
- ZMOTION Detection and Control Product Brief (PB0225)
- ZMOTION Detection Module Product Specification (PS0284)
- ZMOTION Detection Module Product Brief (PB0223)
- ZMOTION Lens and Pyroelectric Sensor Product Specification (PS0286)
- ZMOTION Intrusion Detection Development Kit User Manual (UM0233)
- ZMOTION Intrusion Detection Development Kit Quick Start Guide (QS0078)
- ZMOTION – A New PIR Motion Detection Architecture White Paper (WP0017)
- ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018)
- Board Schematic, assembly drawing and artwork

The contents of the kit are shown in Figure 1.

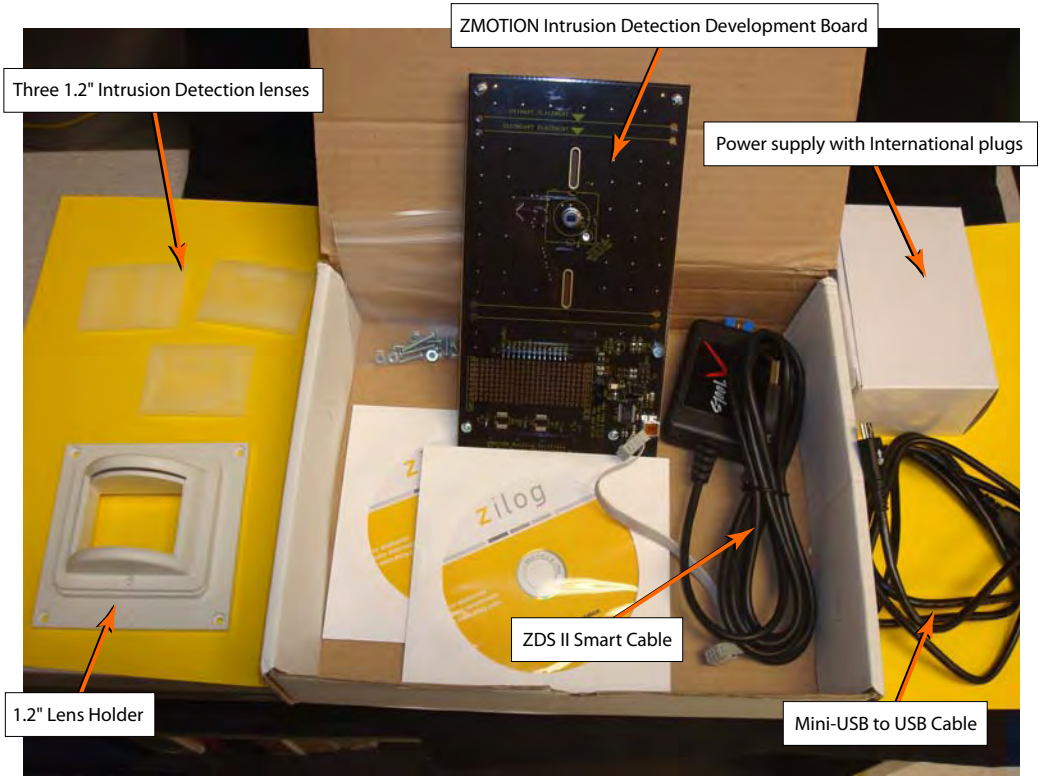

ZMOTION Intrusion Detection Development Board
Three 1.2" Intrusion Detection lenses
Power supply with International plugs
ZDS II Smart Cable
1.2" Lens Holder
Mini-USB to USB Cable

Figure 1. ZMOTION Intrusion Detection Development Kit Contents

Sample code files are included on the ZMOTION Sample Applications CD, and are located in the `ZMOTION_Intrusion_Demo` folders.

System Requirements

An IBM PC (or compatible computer) with the following minimum configurations is required:

- Microsoft Windows 7, Windows XP Professional SP1, Windows 2000 SP3, Windows NT 4.0 SP6
- Pentium II/233 MHz processor or higher up to Pentium IV, 2.8 GHz
- 96 MB RAM or more
- 25 MB hard disk space or more
- Super VGA video adapter
- CD-ROM drive
- USB 2.0 interface port

Installation

For details about installation and setup, refer to the Using the ZMOTION Intrusion Detection Development Kit Quick Start Guide (QS0078).

Safeguards

The following precaution must be observed when working with the devices described in this document.

Caution: Always use a grounding strap to prevent damage resulting from electrostatic discharge (ESD).

ZMOTION Intrusion Detection Development Board

Zilog's ZMOTION Intrusion Detection Development Board is a development and prototyping platform for the ZMOTION Intrusion Detection silicon and software as well as for lens/pyroelectric sensor/silicon and software bundled solutions. The Board provides the user with a tool to evaluate the many features of ZMOTION PIR technology, as well as the actual performance of each lens and pyro combination.

Note: Attach the Intrusion lens holder to the Board using the primary placement set of holes, which are indicated in Figure 2.

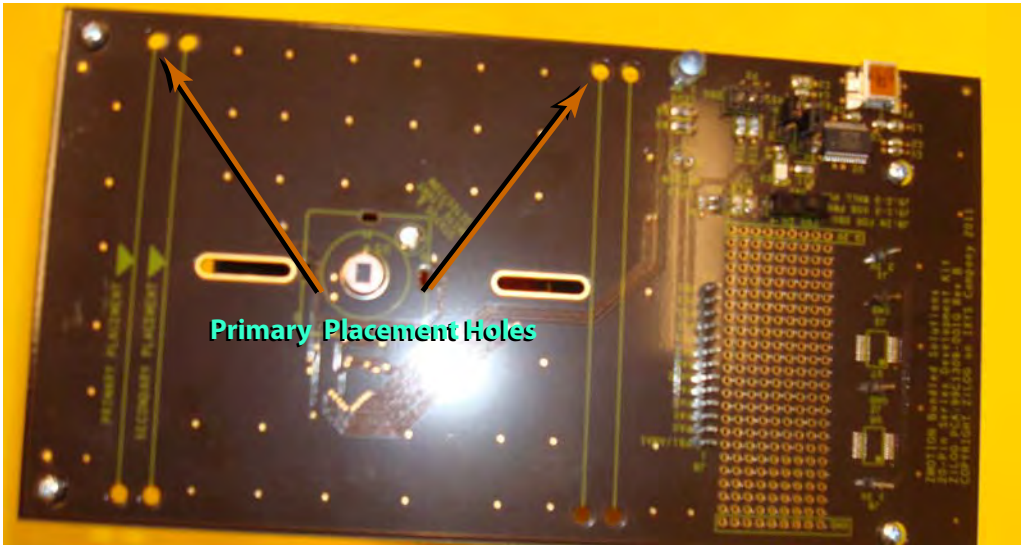


Figure 2. ZMOTION Intrusion Detection Development Board

Features

The ZMOTION Intrusion Detection Development Board features the following elements:

- Z8FS021 ZMOTION Detection MCU (20-pin SSOP)
- Mini-USB power connector and serial interface
- Power-On and Detection LED
- On-chip debugger interface
- Board openings for an assortment of lens holders and clip-on lens attachments

Note: The upper set of holes on the board is used to attach the 1.2" lens holders (see Figure 2).

- Prototyping area
- 2.7V–3.6V operating voltage with 5V tolerant inputs

MCU Features

The Z8FS021 ZMOTION Intrusion Detection MCU combines the programmability and rich peripheral set of Zilog's Flash Z8 Encore! XP Family of MCUs with built-in motion detection software algorithms to provide the functions necessary for PIR motion detection applications.

The Z8FS021 MCU includes the following features:

- High performance eZ8® MCU core
- 2KB in-circuit programmable Flash memory available for application code
- Single-pin debug with unlimited breakpoints

- Flexible clocking scheme
- Internal precision oscillator running at 5.53MHz
- External oscillator operating up to 20MHz
- Sigma Delta ADC
- Up to 6 single-ended channels or 3 differential channels available
- On-chip analog comparator with independent programmable reference voltage
- Full-duplex UART with dedicated BRG
- Two 16-bit timers with input capture, output compare and PWM capability (11 modes total)
- Watchdog timer (WDT) with dedicated internal oscillator
- Up to 20 vectored interrupts
- 6 to 25 I/O pins depending upon package
- 2.7V to 3.6V operating voltage with extended operating temperature range –40°C to +105°C
- Zilog PIR technology controlled and monitored via software API registers
- Selection capability from an assortment of lenses and pyroelectric sensors to best fit your application
- API settings provided for each lens and pyroelectric sensor combination
- Directly supports 1 or 2 pyroelectric sensors
- Sensitivity control, range control and directionality detection
- Extended detection modes for occupancy sensing
- Low power modes
- White light detection and pet immunity

ZMOTION Intrusion Detection Development Kit Lens and Pyroelectric Sensor

The ZMOTION Intrusion Detection Development Kit includes three different types of lenses to fill a wide variety of intrusion detection and security applications. These applications also demonstrate the flexibility, and superior performance of Zilog's PIR motion detection technology.

Please refer to the ZMOTION Lens and Pyroelectric Sensor Product Specification (PS0286) for part-specific details about the individual lenses and pyroelectric sensors. Refer to the ZMOTION Intrusion Detection Development Kit Quick Start Guide (QS0078) for specific installation instructions for the lenses.

Lens Mounting Options

The ZMOTION Development Board supports a lens holder option for each of the 1.2" focal length intrusion lenses, as indicated in Table 1. For lens installation instructions, please refer to the ZMOTION Intrusion Detection Development Kit Quick Start Guide (QS0078).

Table 1. Lens Mounting Options

Lens Mounting	Supported Lenses
Flat Lens Holder 1.2 Focal	WA 1.2 GI 12 V4
	VB 1.2 GI V1
	LR 1.2 GI 12 V3

Pyroelectric Sensor Option

The ZMOTION Intrusion Detection Development Kit includes one type of pyroelectric sensor, the Basic Dual Element sensor, part number RE200B-P, which is mounted directly on the Board.

ZMOTION Development Kit Application Software

The ZMOTION application software includes the ZMOTION_Intrusion_Demo motion detection project, which is described in this section.

ZMOTION_Intrusion_Demo

The ZMOTION_Intrusion_Demo project demonstrates the basic motion detection functionality of the ZMOTION Development Board. The MCU included with the Board is programmed with this project.

Each lens type is supported by an associated lens configuration header file which displays a name format of API_INIT_xx.h. Header files for all supported lens types are included in the include project folder of the ZMOTION_Intrusion_Demo project. The main.c source file contains the include directive to add the header file to the project. Changes to these header files should not be required, but any modifications you make should be made to a copy of the original header file; *do not modify the original versions*. As new lens types are added to the ZMOTION family, an associated lens configuration file is made available on the Zilog website.

Table 2 lists additional project features that can be modified or enabled in main.c and main.h.

Table 2. Additional Project Features

Feature	File	Define/Variable	Default Values
LED on time duration	main.c	cMDDelayTime	DELAY_1SEC (1 second)
White Light Immunity On/Off	main.h	WHITE_LIGHT	0 (Off)
White Light Threshold	main.h	WHITE_LIGHT_THRESH_DEF	0x1F (Max)
White Light Anti-Jam On/Off	main.h	WHITE_LIGHT_ANTI_JAM_DEF	0 (Off)
Detailed Status Reporting On/Off	main.h	VERBOSE	0 (Off)
Lens Support	main.c	#include "API_INIT_xx.h"	API_INIT_09.h

When motion is detected, the LED is turned ON for 1 second (`cMDDelayTime`). A serial terminal program such as HyperTerminal can be used to view the detection messages from the ZMOTION Development Board (see Figure 3). In the figure, ***r045*** indicates the version of the application; the ***S*** following it is displayed when the pyroelectric sensor has become stable and the system is ready to detect motion. When motion is detected, an ***M*** or ***E*** is displayed to indicate the type of detection (normal ***M***otion or ***E***xtended motion), along with the count and a time stamp (in seconds) after power-up.

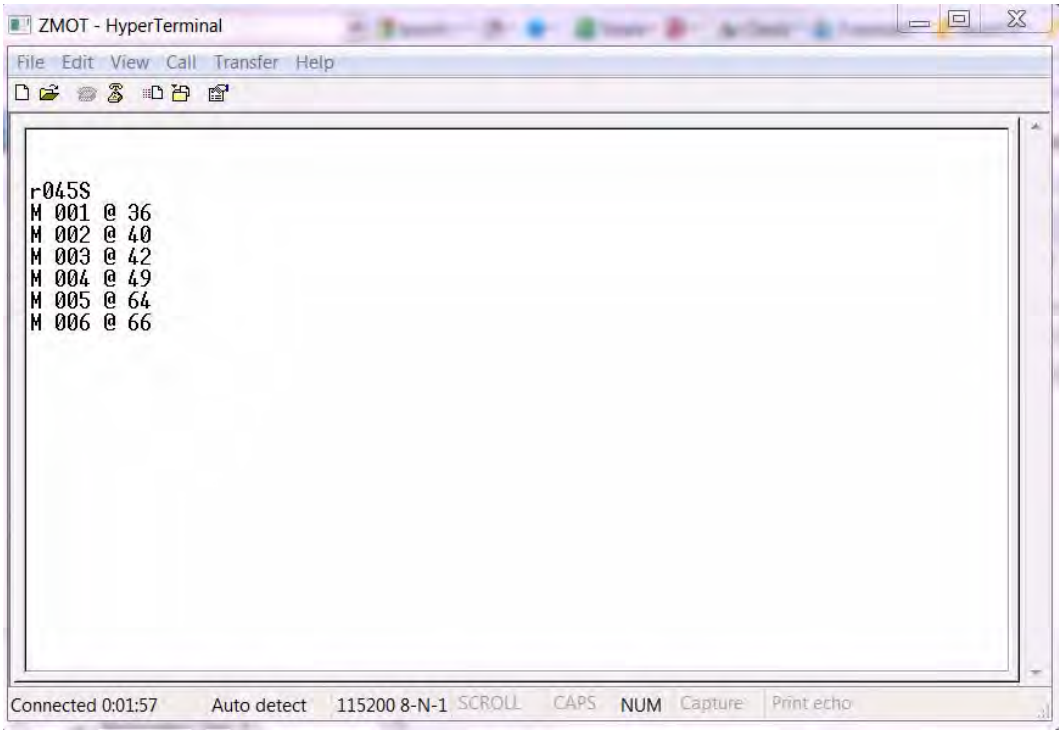


Figure 3. The ZMOTION_Intrusion_Demo project running in HyperTerminal

Installing ZDSII and the USB Smart Cable

Observe the following the steps to install Zilog Developer Studio (ZDSII) and its associated documentation.

1. Insert the ZDSII CD into the CD-ROM drive. The DemoShield installer launches automatically. If DemoShield does not launch automatically, open Windows Explorer, browse to your CD-ROM drive and double-click `launch.exe` to launch DemoShield.
2. From the product installer list, you can choose to install ZDSII alone, or both ZDSII and its associated documentation. You can also copy the documentation directly from your CD-ROM drive to your hard disk using Windows Explorer, or read the documentation directly from the CD-ROM itself.

For customer service and technical support, Zilog recommends that you create an account at support.zilog.com.

Installing the USB Smart Cable

This section describes how to install the USB Smart Cable and associated driver software for your particular operating system.

Windows 7 32/64

Observe the following steps to install the USB Smart Cable for Windows Vista 32-bit systems.

1. Connect the USB Smart Cable to the Host PC. A window message stating **Driver Software Installation** appears.
2. Windows automatically searches the driver; this process can sometimes take a few minutes to complete. In this case, wait for the search to complete, since there is no option to terminate this process immediately. If the driver was previously installed, Windows automatically installs the USB Smart Cable driver. If this is the case, proceed to Step 9. If Win-

dows cannot find the driver, close the Search dialog and continue to Step 3.

3. In the Windows Start menu's **Search programs and files** field, enter `Device Manager` and click the Enter key. A **Device Manager** link will appear in the Start menu's resulting Program list; click to launch it.
4. In the Device Manager, under **Other devices**, right-click **USB Smart Cable**.
5. Select **Update Driver Software**.
6. In the **Update Driver Software - USB Smart Cable** dialog, select the **Browse my computer for driver Software** option.
7. Browse to one of the following driver directories:

   For 32-bit versions:

   ```
   <ZDS II Installation Directory>\device drivers\USB\x32
   <ZDS II Installation CD>\device drivers\USB\x32
   ```

   For 64-bit versions:

   ```
   <ZDS II Installation Directory>\device drivers\USB\x64
   <ZDS II Installation CD>\device drivers\USB\x64
   ```

8. Click **Next** to install the driver. On 32-bit systems, a **Windows Security** dialog will appear; select **Install this driver software anyway**.
9. After the Wizard finishes the installation, click the **Close** button.

Windows Vista, 32-bit OS

Observe the following steps to install the USB Smart Cable for Windows Vista 32-bit systems.

1. Connect the USB Smart Cable to the host PC. The **Found New Hardware** dialog box is displayed.
2. Select **Locate and install the driver software (recommended)**. The **Driver Software Installation** window is displayed, followed by the **Found New Hardware-USB Smart Cable** dialog box.
3. When prompted, select **I don't have the disc. Show me other options**.
4. When prompted, select **Browse my computer for driver software (advanced)**.
5. Browse to the following driver directory:

   ```
   <ZDS II Installation Directory>\device drivers\USB
   ```

6. The Windows Security dialog box is displayed; select **Install this driver software anyway**.
7. Upon successful installation, click **Close**.

Windows XP

Observe the following steps to install the USB Smart Cable for Windows XP systems.

1. Connect the Zilog USB device to the host PC. The **Found New Hardware** wizard should activate automatically after connecting the Zilog USB device for the first time. If prompted to connect to Windows Update, select **No, not at this time**.
2. Select **[Install from a list or specific location (Advanced)]**; then click **Next**.

Note: If the Windows Logo testing dialog appears, select **Continue Anyway**.

3. Select **Search for the best driver in these locations and Include this location in search**.
4. Browse to the following driver directory, then click **Next**.

   `<ZDS installation>\device drivers\USB\`

5. After you find the appropriate driver, click **Next**.
6. Click **Finish** to complete the installation.

Windows 2000

Observe the following steps to install the USB Smart Cable for Windows 2000 systems.

1. Connect the Zilog USB device to the host PC. The **Found New Hardware** wizard should activate automatically after connecting the Zilog USB device for the first time.
2. After the **Found New Hardware** wizard has been activated, click **Next**.
3. Select **Search for a suitable driver for my device (Recommended)**, then click **Next**.
4. Select **Specify a location** and click **Next**.
5. Browse to the following driver directory, then click **OK**.

   `<ZDS installation>\device drivers\USB\`

6. After you find the appropriate driver, click **Next**.
7. Click **Finish** to complete the installation.

Connecting the USB Smart Cable

Observe the following steps to connect the USB Smart Cable to the ZMOTION Development Board.

Caution: The power to the development board must be disconnected or turned OFF before connecting or disconnecting the USB Smart Cable.

1. Attach one end of the six-conductor ribbon cable (included) to the USB Smart Cable six-pin DBG connector, as shown in Figure 4.

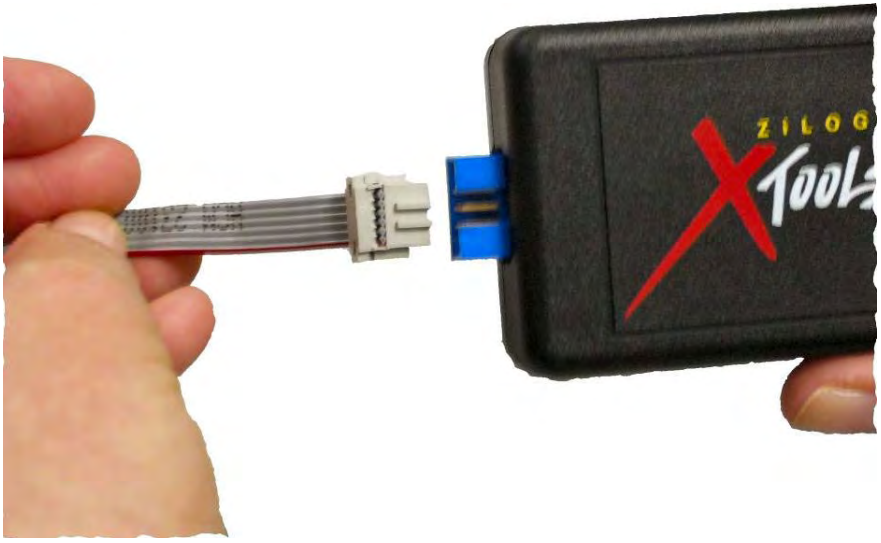


Figure 4. Connecting the Six-Conductor Ribbon Cable to the USB Smart Cable

2. Attach the free end of the ribbon cable to the DBG connector (ZDI Interface) on the development board. Ensure that pin 1 on the ribbon cable (indicated by the dark stripe) is aligned with pin 1 on the target connector (indicated by a 1 on P2 of the board).

Installing the FTDI USB to Serial Driver

Observe the following steps to install the FTDI USB to Serial Driver.

1. Make sure that the USB cable is not plugged into the ZMOTION Development Board.
2. On the CDROM, double-click the `CDM20802_Setup.exe` file to start the driver installation. The installation process will begin, and will appear similar to the following code statements:

   ```
   32-bit OS detected
   <installation path>\dpinstx86.exe
   Installation driver
   FTDI CDM driver installation process completed.
   ```

3. When the installation is complete, plug the USB cable into the ZMOTION Development Board.
4. If driver installation was successful, **USB Serial Port (COMx)** should appear in the list displayed in the Device Manager's **Ports (COM & LPT)** interface.

   To open the Device Manager on Windows 7 systems, launch the Start menu, enter `Device Manager` in the **Search program and files** field, and press the Enter key.

   To open the Device Manager on earlier Windows systems, navigate to the following filepath:

   Start → Control Panel → System → Hardware → Device Manager → Ports (COM &LPT).

Downloading and Running the Sample Project

Sample projects are included on the Application CD. Copy these projects to a convenient folder on your PC. Once copied, ensure the folders are not

set to **Read Only** by right-clicking the folder and selecting properties. Deselect the **Read Only** attribute and click **OK**. Make sure you apply changes to this and the other subfolders when prompted.

In this example, we reference the `ZMOTION_Intrusion_Demo` project; however, the steps that follow will apply to any additional project.

Note: At this point you should have loaded ZDSII and the Smart Cable USB driver on to your computer. If you haven't yet done so, revisit the beginning of this Installing ZDSII and the USB Smart Cable section before proceeding.

1. Open ZDSII and select **File** → **Open Project**, then navigate to the project folder labeled `ZMOTION_Intrusion_Demo`.
2. Open the `ZMOTION_Intrusion_Demo.zdsproj` project. When you first receive your kit, this project is already loaded into the ZMOTION MCU. Right-click within the open grey area below the menu icons and select **Workbook Mode** to turn on the tabs at the bottom of the editor and therefore make it easier to switch between files.
3. Click the **Rebuild All** icon to build the project. The build output should not indicate any errors. If you receive errors, try reloading the projects from the original Application CD and ensure that the folders are not set to **Read Only**. See Figure 5 for an example; Figure 6 indicates the location of the **Rebuild All** icon in the ZDSII menu bar.

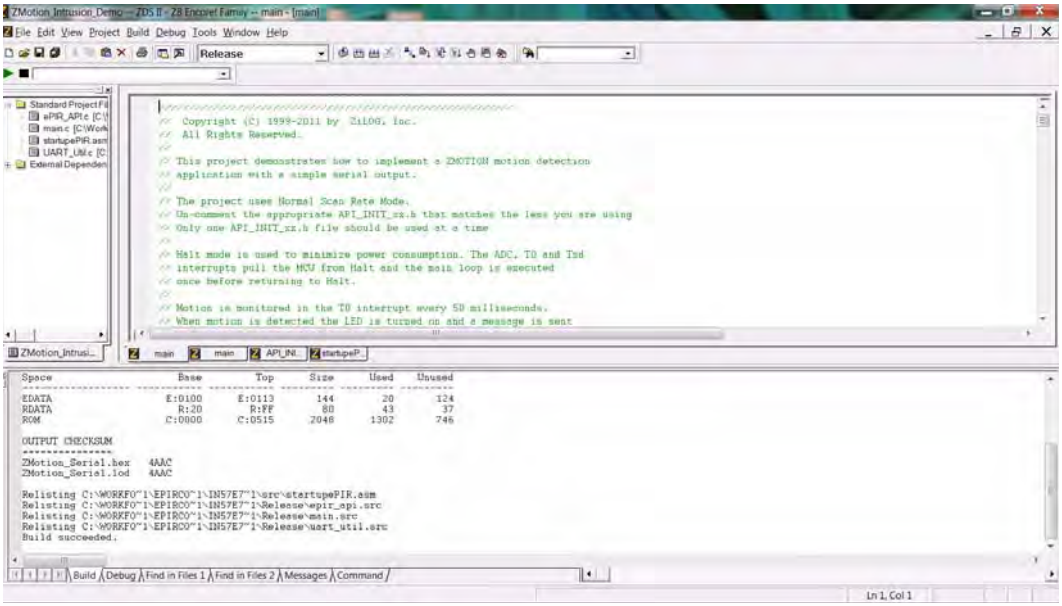

File Edit View Project Build Debug Tools Window Help
Release
Copyright (C) 1999-2011 by ZiLOG, Inc.
All Rights Reserved.
This project demonstrates how to implement a ZMOTION motion detection
application with a simple serial output.
The project uses Normal Scan Rate Mode.
Un-comment the appropriate API_INIT_xx.h that matches the lens you are using
Only one API_INIT_xx.h file should be used at a time
Halt mode is used to minimize power consumption. The ADC, T0 and Tx0
interrupts pull the MCU from Halt and the main loop is executed
once before returning to Halt.
Motion is monitored in the T0 interrupt every 50 milliseconds.
When motion is detected the LED is turned on and a message is sent
Space Base Top Size Used Unused
EDATA E:0100 E:0113 144 20 124
RDATA R:20 R:FF 80 43 37
ROM C:0000 C:0515 2048 1302 746
OUTPUT CHECKSUM
ZMotion_Serial.hex 4AAC
ZMotion_Serial.lod 4AAC
Relisting C:\WORKFO~1\EPIRCO~1\IN57E7~1\src\startupPIR.asm
Relisting C:\WORKFO~1\EPIRCO~1\IN57E7~1\Release\epir_api.src
Relisting C:\WORKFO~1\EPIRCO~1\IN57E7~1\Release\main.src
Relisting C:\WORKFO~1\EPIRCO~1\IN57E7~1\Release\uart_util.src
Build succeeded.
Build
Debug
Find in Files 1
Find in Files 2
Messages
Command
Ln 1, Col 1

Figure 5. Building the ZMOTION_Intrusion_Demo project in ZDSII

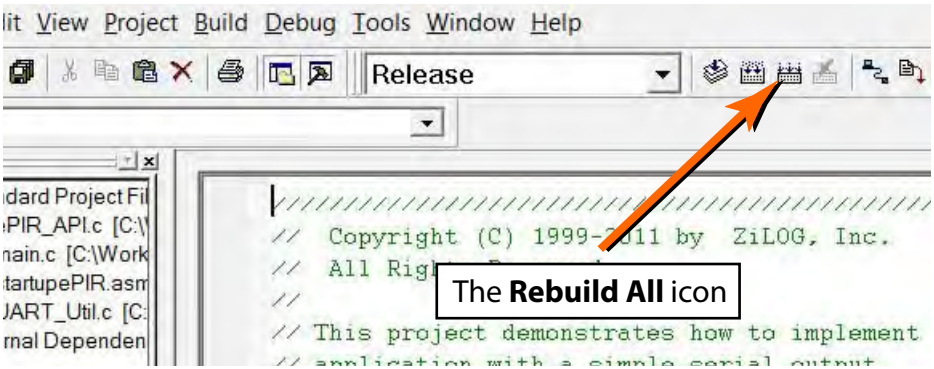


Figure 6. The Location of the Rebuild All Icon

4. Make sure that the ZMOTION Development Board is powered OFF, then connect the USB Smart Cable (Debugger) to P2, as described above.
5. Apply power to the Development Board by plugging in the USB cable and setting SW1 to the ON position. Next, click the **Reset** icon in ZDS II. Figure 7 indicates the location of both the **Reset** and **Go** icons in the ZDS II menu bar.

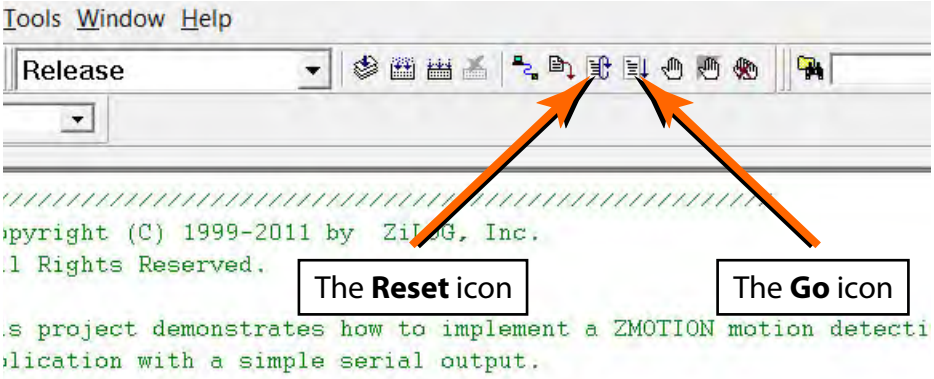


Figure 7. The Location of the Rest and Go Icons

6. An information notice may appear, indicating that the silicon is not the latest version. This occurrence is normal and is not an issue. Click **OK** to continue. You should see a message in the Debug Output Window indicating that the load was successful, as shown in Figure 8.

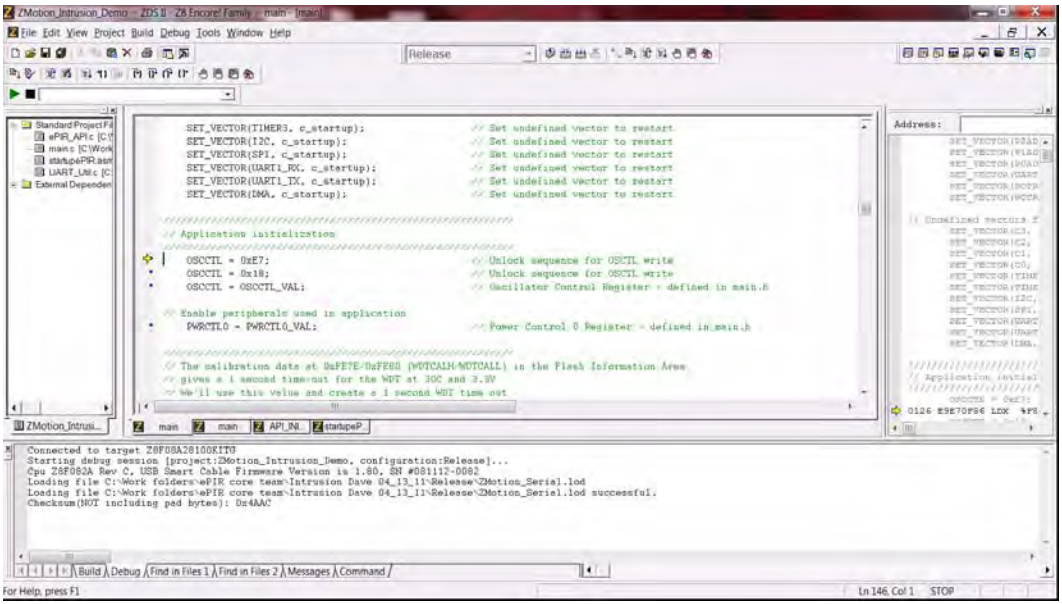

File Edit View Project Build Debug Tools Window Help
Release
SET_VECTOR(TIMER3, c_startup);
SET_VECTOR(I2C, c_startup);
SET_VECTOR(SPI, c_startup);
SET_VECTOR(UART1_RX, c_startup);
SET_VECTOR(UART1_TX, c_startup);
SET_VECTOR(DMA, c_startup);
// Application initialization
OSCCTL = 0xE7;
OSCCTL = 0x18;
OSCCTL = OSCCTL_VAL;
// Enable peripherals used in application
PWRCTL0 = PWRCTL0_VAL;
// The calibration data at 0xFE7E/0xFE80 (WDTCALH/WDTCALL) in the Flash Information Area
// gives a 1 second timeout for the WDT at 30C and 3.3V
// We'll use this value and create a 1 second WDT time out
Address:
Connected to target Z8F08A28100KITG
Starting debug session [project:ZMotion_Intrusion_Demo, configuration:Release]...
Cpu Z8F082A Rev C, USB Smart Cable Firmware Version is 1.80, SN #081112-0082
Loading file C:\Work folders\ePIR core team\Intrusion Dave 04_13_11\Release\ZMotion_Serial.lod
Loading file C:\Work folders\ePIR core team\Intrusion Dave 04_13_11\Release\ZMotion_Serial.lod successful.
Checksum(NOT including pad bytes): 0x4AAC
Build Debug Find in Files 1 Find in Files 2 Messages Command
For Help, press F1
Ln 146, Col 1
STOP

Figure 8. ZDSII's Debug Output Window for the ZMOTION_Basic project

7. Click the **Go** icon to start the application running. The Red LED (LED2) will be ON initially until the pyroelectric sensor stabilizes – a period that can take up to 30 seconds. After it has stabilized, (LED2) turns OFF, to turn ON only when motion is detected.
8. To test this procedure, wave your hand over the lens and notice (LED2) turning ON for approximately 1 second.

Making Changes to the ZMOTION_Intrusion_Demo Project

To change the duration of the LED on time, observe the following procedure.

1. Change the following line in the `main.c` file:

```
unsigned int cMDDelayTime = DELAY_1SEC;     // LED ON time
```

2. Change the line as follows to select a five-second LED on time:

```
unsigned int cMDDelayTime = DELAY_5SEC;     // LED ON time
```

Note: **LED on time** definitions are provided in the `main.h` file for values from 200 ms to 30 minutes.

3. Click the **Rebuild** icon to build the project. The build output should not indicate any errors. Click the **Go** icon to download the modified project and start the application running. Generate motion and notice that the LED now stays on for 5 seconds.
4. To change the lens used by the project, edit the `include` line at the top of the `main.c` file to include the appropriate `API_INIT` file. The project initially uses `API_INIT_09.h` to support the WA 1.2 GI 12 V4 (board clip-in) lens (see the code sample below). To use a different lens, edit out the comment characters (//) in the `main.c` file that correspond to the new lens, and comment out the lens that is no longer in use.

```
replace with:
// This file must match the lens and PIR sensor used in the application
//#include "API_INIT_00.h"          // Generic settings: non-lens-specific
//#include "API_INIT_01.h"          // API configuration file for AA 0.9 GI V1 Lens
//#include "API_INIT_02.h"          // API configuration file for CM 0.77 GI V3 Lens
```

```
//#include "API_INIT_03.h"          // API configuration file for CM 0.77 GI V5 Lens
//#include "API_INIT_04.h"          // API configuration file for CWM 0.5 GI V1 Lens
//#include "API_INIT_05.h"          // API configuration file for NCL-9(26) Lens
//#include "API_INIT_06.h"          // API configuration file for NCL-10IL Lens
//#include "API_INIT_07.h"          // API configuration file for NCL-3B Lens
//#include "API_INIT_08.h"          // API configuration file for NCL-11 Lens
#include "API_INIT_09.h"            // API configuration file for WA1.2 GI 12 V4 Lens
//#include "API_INIT_10.h"          // API configuration file for LR1.2 GI 12 V3 Lens
//#include "API_INIT_11.h"          // API configuration file for VB1.2 GI V1 Lens
```

The API_INIT file must match the lens and pyroelectric sensor being used on the Development Board. Use the Lens Selection Guide in the ZMOTION Lens and Pyroelectric Sensor Product Specification (PS0286) to determine which API_INT file is required for each lens and Pyroelectric Sensor combination.

Board Design Information

Figure 9 displays the schematics for the ZMOTION Development Board.

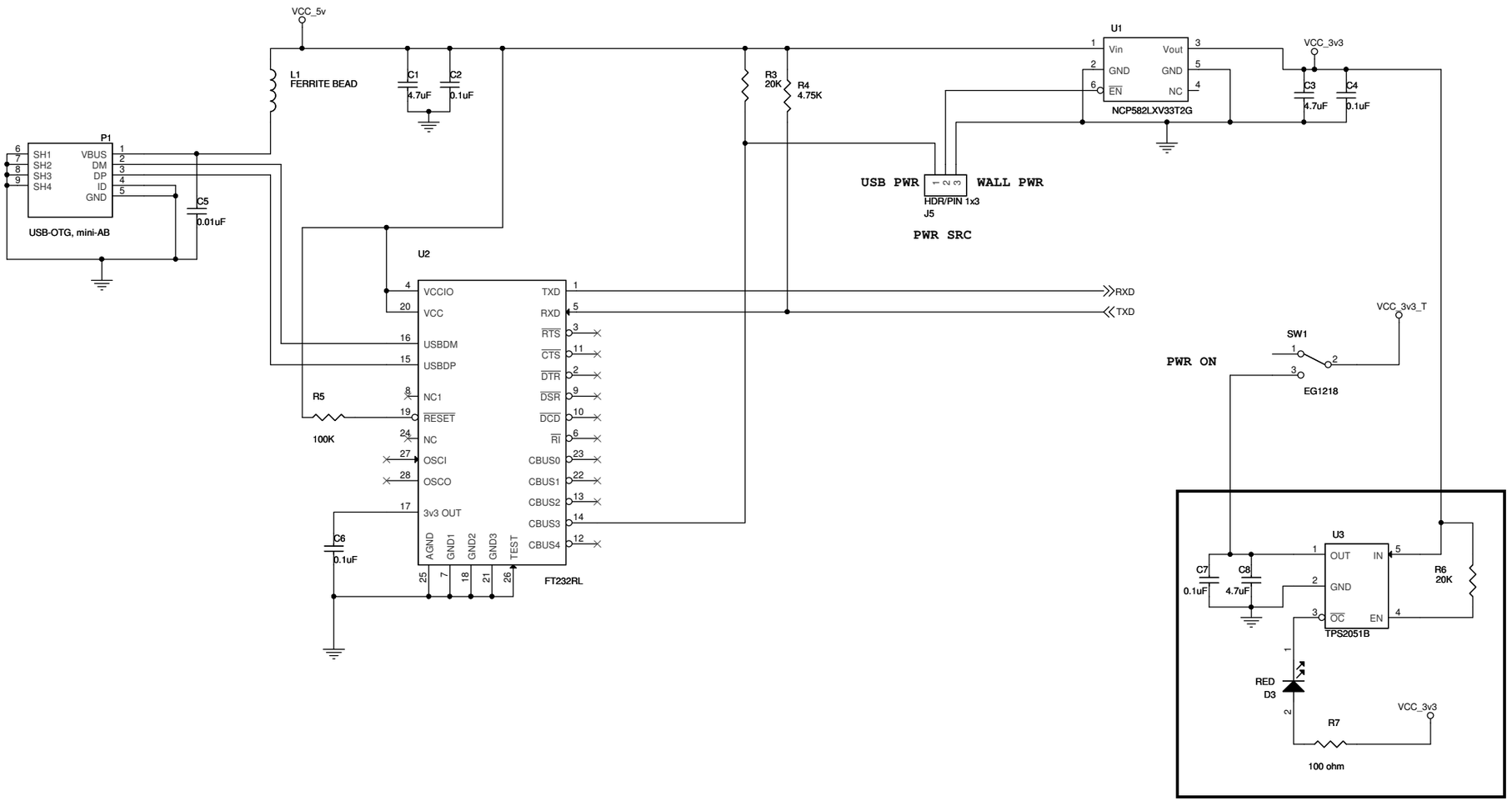
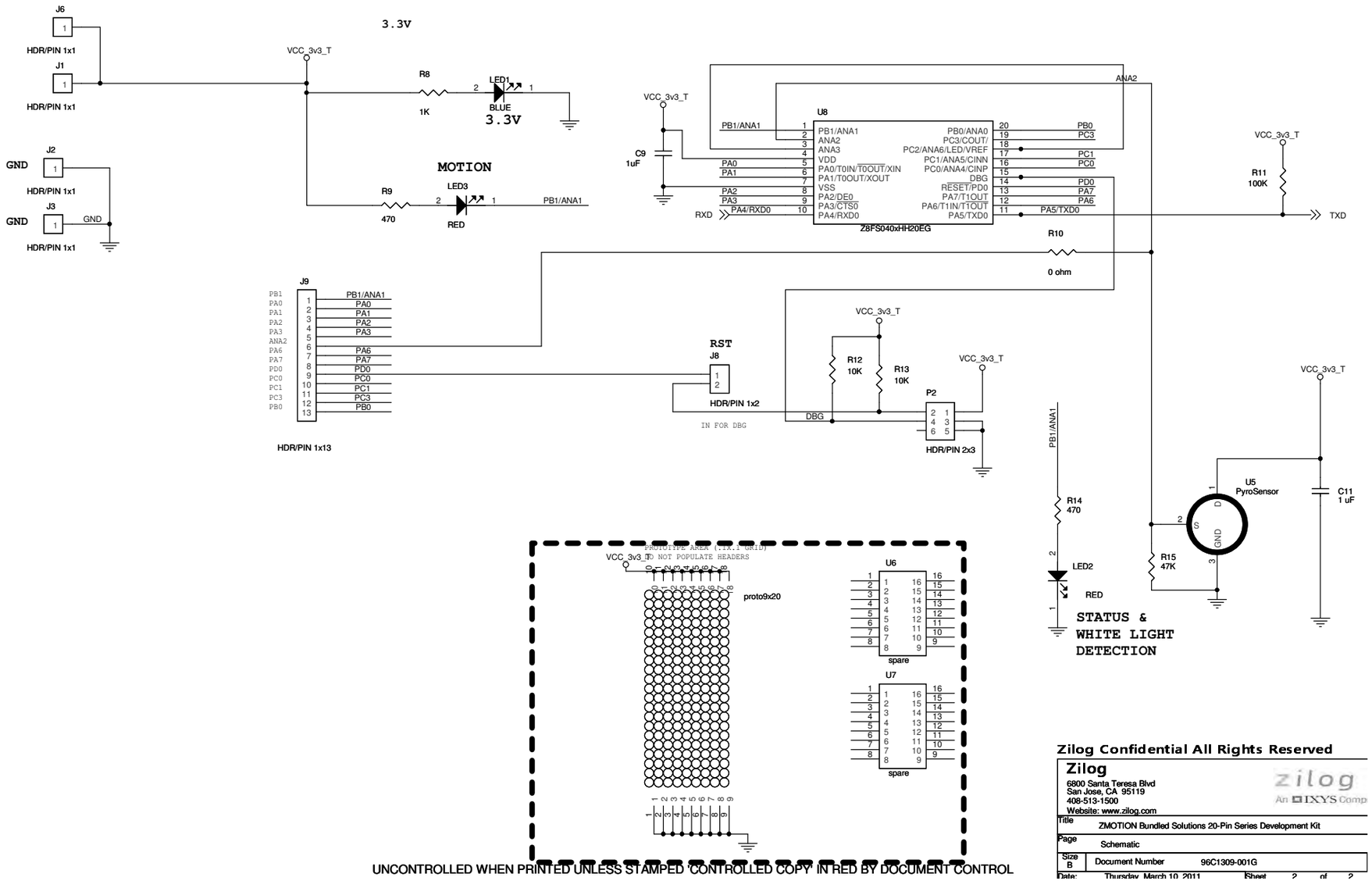


Figure 9. ZMOTION Development Board Schematic Diagram, #1 of 2



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Title	ZMOTION Bundled Solutions 20-Pin Series Development Kit
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Size B	Document Number 96C1309-001G
Date:	Thursday, March 10, 2011 Sheet 2 of 2

Figure 10. ZMOTION Development Board Schematic Diagram, #2 of 2

Figures 11 and 12 display top- and bottom-view mechanical drawings, respectively, of the ZMOTION Development Board.

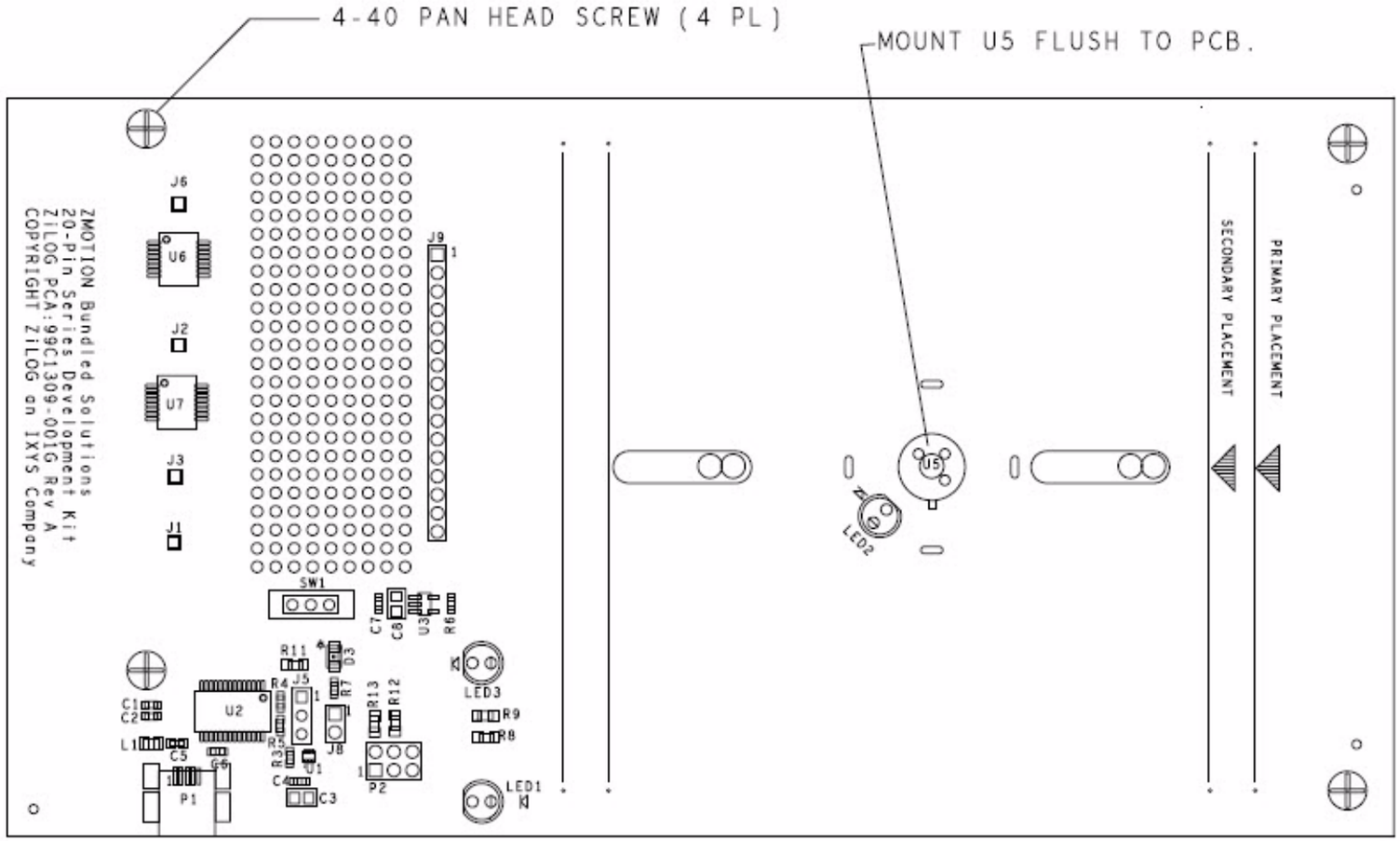

Figure 11. ZMOTION Development Board Mechanical Diagram, Top View

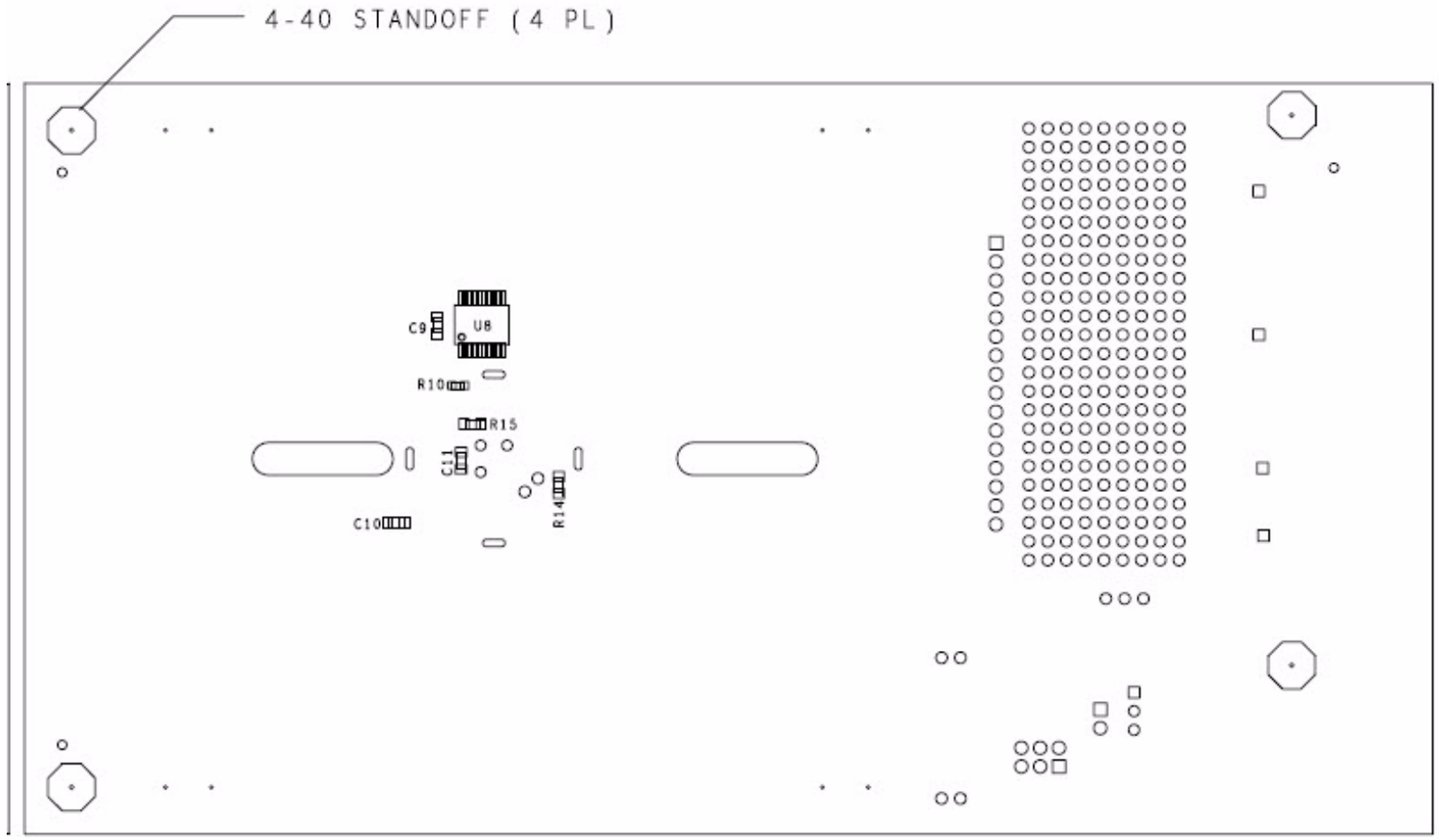

Figure 12. ZMOTION Development Board Mechanical Diagram, Bottom View

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